CLAIMS

What is claimed is:

1. A method for scheduling transmissions in a network including a plurality of collocated nodes and a plurality of non-collocated nodes, wherein the plurality of collocated nodes communicate between one another over a first interface and the plurality of non-collocated nodes communicate with the plurality of collocated nodes over a second interface, said method comprising the steps of:

exchanging scheduling information between the plurality of collocated nodes over the first interface, said scheduling information associated with transmissions between the plurality of collocated nodes and each of the plurality of non-collocated nodes on the second interface; and

determining, based at least in part on said scheduling information, a schedule for the plurality of collocated nodes for transmissions between the plurality of collocated nodes and each of the plurality of non-collocated nodes on the second interface.

2. The method of claim 1, wherein said step of exchanging scheduling information comprises exchanging said scheduling information over said first interface during a time frame while the plurality of non-collocated nodes send data packets to, and receive data packets from, each of the plurality of collocated nodes over the second interface.

3. The method of claim 2, wherein said time frame comprises a first time frame and said step of determining comprises determining a schedule for the plurality of collocated nodes for transmissions between the plurality of collocated nodes and each of the plurality of non-collocated nodes on the second interface, wherein said transmissions occur during a second time frame subsequent to said first time frame.

4. The method of claim 1, wherein communications over the second interface are performed using a plurality of time frames, each comprising a control and data portion, wherein said scheduling information comprises first scheduling information, wherein said step of exchanging scheduling information comprising exchanging said first scheduling information over the first interface during said data portion of said time frame, and wherein the method further comprises the step of exchanging second control information between the plurality of non-collocated nodes and each of the plurality of collocated nodes over the second interface during said control portion of said time frame, said second scheduling information associated with transmissions between the plurality of collocated and each of the plurality of non-collocated nodes.

5. The method of claim 1, wherein said step of exchanging scheduling information comprises sending a schedule packet from each of a first at least one collocated node to each of a second at least one collocated node of said plurality of collocated nodes, said schedule packet including an indication of all known nodes in the two-hop neighborhood of each of said first at least one node , incoming and outgoing collision-free links of each of said first at least one node that are already scheduled, time slots and data channels in which new links with each of said first at least one node can be reserved, and time slots and data channels on which each of said first at least one node will be listening while not active in scheduled links.

6. The method of claim 1, wherein said step of exchanging scheduling information comprises the steps of:

sending a schedule packet from a first at least one collocated node of said plurality of collocated nodes to a second at least one collocated node of said plurality of collocated nodes over the first interface; and

sending, in response to receiving said schedule packet, an acknowledgement packet from said second at least one

collocated node to said first at least one collocated node over the first interface.

7. The method of claim 6, wherein said step of exchanging scheduling information further comprises the steps of:

setting, in said second at least one collocated node of said plurality of collocated nodes, a sequence number of a last received schedule packet to a value of a sequence number of said schedule packet received from said first at least one collocated node of said plurality collocated nodes in said step of sending;

sending a hello packet from said first at least one collocated node of said plurality of collocated nodes to said second at least one collocated node of said plurality of collocated nodes, said hello packet identifying said first at least one collocated node and a sequence number of a last sent schedule packet from said first at least one collocated node;

determining if said sequence number of a last sent schedule packet indicates that said sequence number of a last sent schedule packet is less than said sequence number for a last received schedule packet;

and, in response to a positive determination:

transmitting a hello-response from said second at least one collocated node to said first at least one node of said plurality of collocated nodes, said hello-response including said sequence number for a last received schedule packet.

8. The method of claim 7, wherein said hello packet comprises a first hello packet and said step of exchanging scheduling information further comprises the steps of:

receiving said hello-response at said first at least one collocated node of said plurality of collocated nodes;

resetting said sequence number of a last sent schedule packet to the larger of said sequence number of a last sent schedule packet or 1 plus said sequence number of a last received schedule packet received in said hello-response; and

sending a second hello packet from said first at least one collocated node said second at least one collocated node of said plurality of collocated nodes, said hello packet identifying said first at least one collocated node and said sequence number of said last sent schedule packet as reset in said step of resetting.

9. The method of claim 6, wherein said step of exchanging scheduling information further comprises the steps of:

setting, in said second at least one collocated node of said plurality of collocated nodes, a sequence number of a last received schedule packet to said value a sequence number of said schedule packet received from said first at least one collocated node of said plurality of collocated nodes in said step of sending;

sending a hello packet from said first at least one collocated node of said plurality of collocated nodes to a second at least one collocated node of said plurality of collocated nodes, said hello packet identifying said first at least one collocated node and a sequence number of a last sent schedule packet from said first at least one collocated node;

determining if said sequence of a last send schedule packet indicates that said sequence number or a last sent schedule packet is less than said sequence number for a last received schedule packet;

and, in response to a negative determination, setting said sequence number of a last received schedule packet to said sequence number of a last sent schedule packet.

10. The method of claim 1, wherein said first interface comprises a wired link and said second interface comprises a wireless link.

11. The method of claim 1, wherein said wireless link comprises a plurality of RF channels and the plurality of collocated nodes communicates with at least two of the plurality of non-collocated nodes simultaneously over orthogonal channels of said plurality of RF channels.

12. A communications network, said network comprising:

a plurality of non-collocated nodes, each of said plurality of non-collocated nodes capable of receiving and transmitting transmissions on a first interface; and

a plurality of collocated noes, said plurality of collocated nodes each capable of communicating between one another over a second interface, each of said plurality of collocated nodes further capable of receiving and transmitting transmissions to and from said plurality of non-collocated nodes on said first interface, wherein said plurality of collocated nodes exchanges scheduling information with one another over said second interface, said scheduling information associated with transmissions between the plurality of collocated nodes and each of the plurality of non-collocated nodes on said first interface, and determines, based at least in part on said scheduling information, a schedule for said plurality of collocated nodes for transmission between said plurality of collocated nodes and each of said plurality of non-collocated nodes on said first interface.

13. The network of claim 12, wherein said plurality of collocated nodes exchanges said scheduling information over said second interface during a time frame while said plurality of non-collocated nodes send data packets to, and receive data packets from, each of the plurality of collocated nodes over said first interface.

14. The network of claim 13, wherein said time frame comprises a first time frame and wherein said schedule determined by said plurality of collocated nodes comprises a schedule for said plurality of collocated nodes for transmissions between said plurality of non-collocated nodes on said first interface, wherein said transmissions occur during a second time frame subsequent to said first time frame.

15. The network of claim 12, wherein communications over said first interface are performed using a plurality of time frames, each comprising a control and data portion, wherein said scheduling information comprises first scheduling information, wherein said plurality of collocated nodes exchanges said first scheduling information over said second interface during said data portion of said time frame, and wherein said plurality of collocated nodes further exchanges second control information with each of said plurality of non-collocated nodes over said first interface during said control portion of said time frame, said second scheduling information associated with transmissions between said plurality of collocated nodes and each of said plurality of non-collocated nodes.

16. The network of claim 12, wherein said plurality of collocated nodes exchanges scheduling information comprising a schedule packet, said schedule packet including an indication of all known nodes in the two-hop neighborhood of a sending collocated node, incoming and outgoing collision-free links of said sending collocated node that are already scheduled, time slots and data channels in which new links with said sending collocated node can be reserved, and time slots and data channels on which said collocated node will be listening while not active in scheduled links.

17. The network of claim 12 wherein said first interface comprises a wireless link and said second interface comprises a wired link.

18. An apparatus in a communications network including a plurality of non-collocated routers capable of communicating over a first interface, said apparatus comprising:

at least two collocated routers, said at least two collocated routers capable of communications between one another over a second interface, and said at least two collocated routers capable of communications with each of the plurality of non-collocated routers over the first interface, wherein said at least two routers exchange scheduling information over said second interface, said scheduling information associated with transmissions between said at least two collocated routers and the plurality of non-collocated routers on the first interface, and wherein said at least two collocated routers determine, based at least in part on said scheduling information, a schedule for transmission between said at least two collocated routers and each of the plurality of non-collocated routers on the first interface.

19. The apparatus of claim 18, wherein the first interface comprises a wireless link and said second interface comprises a wired link.

20. The apparatus of claim 19, wherein said at least two collocated routers exchange said scheduling information over said wired link substantially simultaneously with said at least two collocated routers exchanging data with the plurality of non-collocated nodes over said wireless link.

21. The apparatus of claim 18, wherein said at least two collocated routers and the plurality of routers and the plurality of non-collocated routers communicating over the first interface using a plurality of time frames, each of said plurality of time frames including a control portion and a data portion, and

wherein said at least two collocated routers exchange said scheduling information over said second interface substantially simultaneously with the data portion of a selected at least one frame of said plurality of frames transmit on the first interface.

22. The apparatus of claim 21, wherein said selected at least one frame comprises a first selected at least one frame and wherein said schedule for transmission between said at least two collocated routers and each of the plurality of non-collocated routers on the first interface comprises a schedule for transmission during a second selected at least one frame of said plurality of frames transmit subsequent to said first selected at least one frame.

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